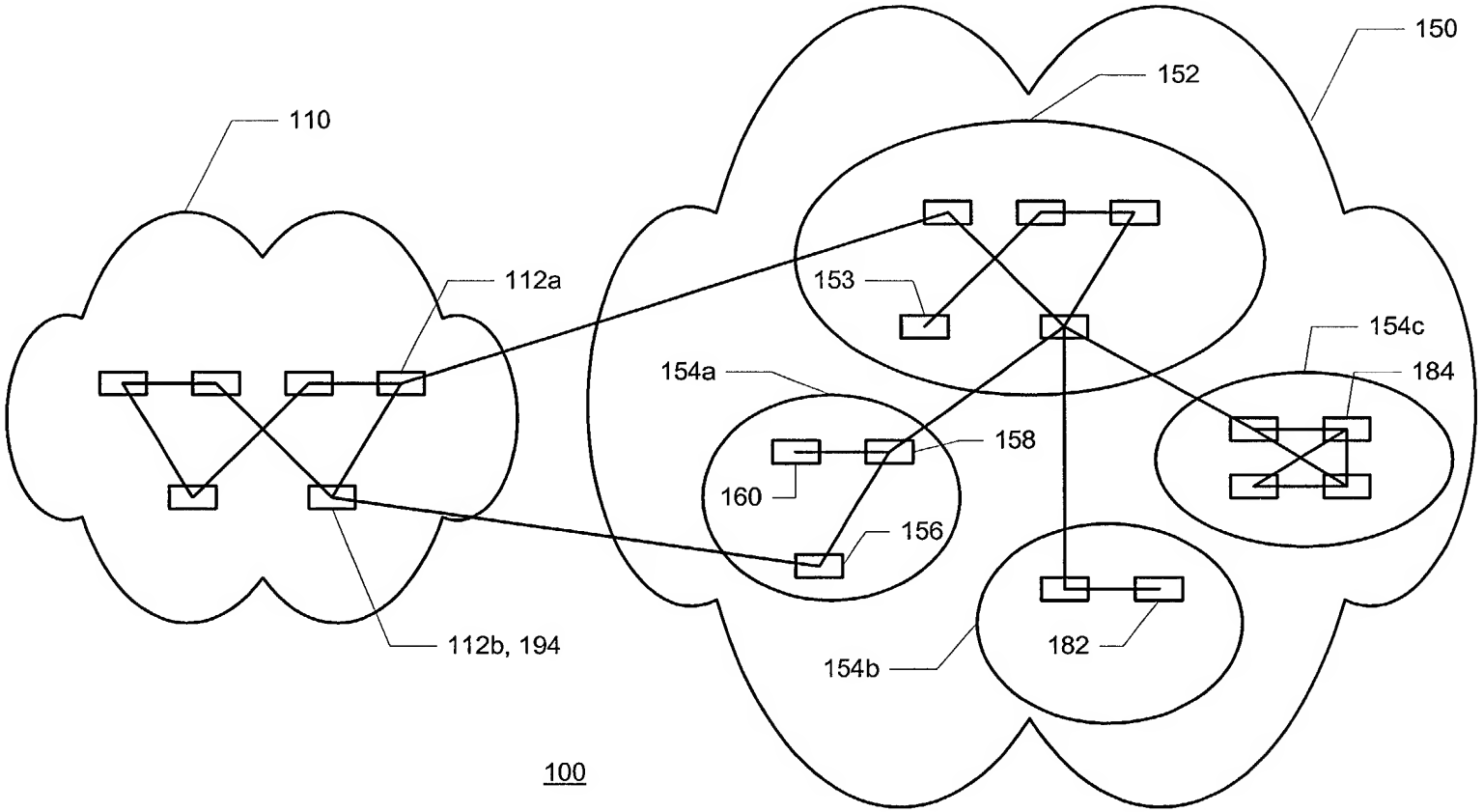
150
152
110
112a
153
154c
154a
184
158
160
156
112b, 194
154b
182
100

FIGURE 1

PORTER-EXHIBIT

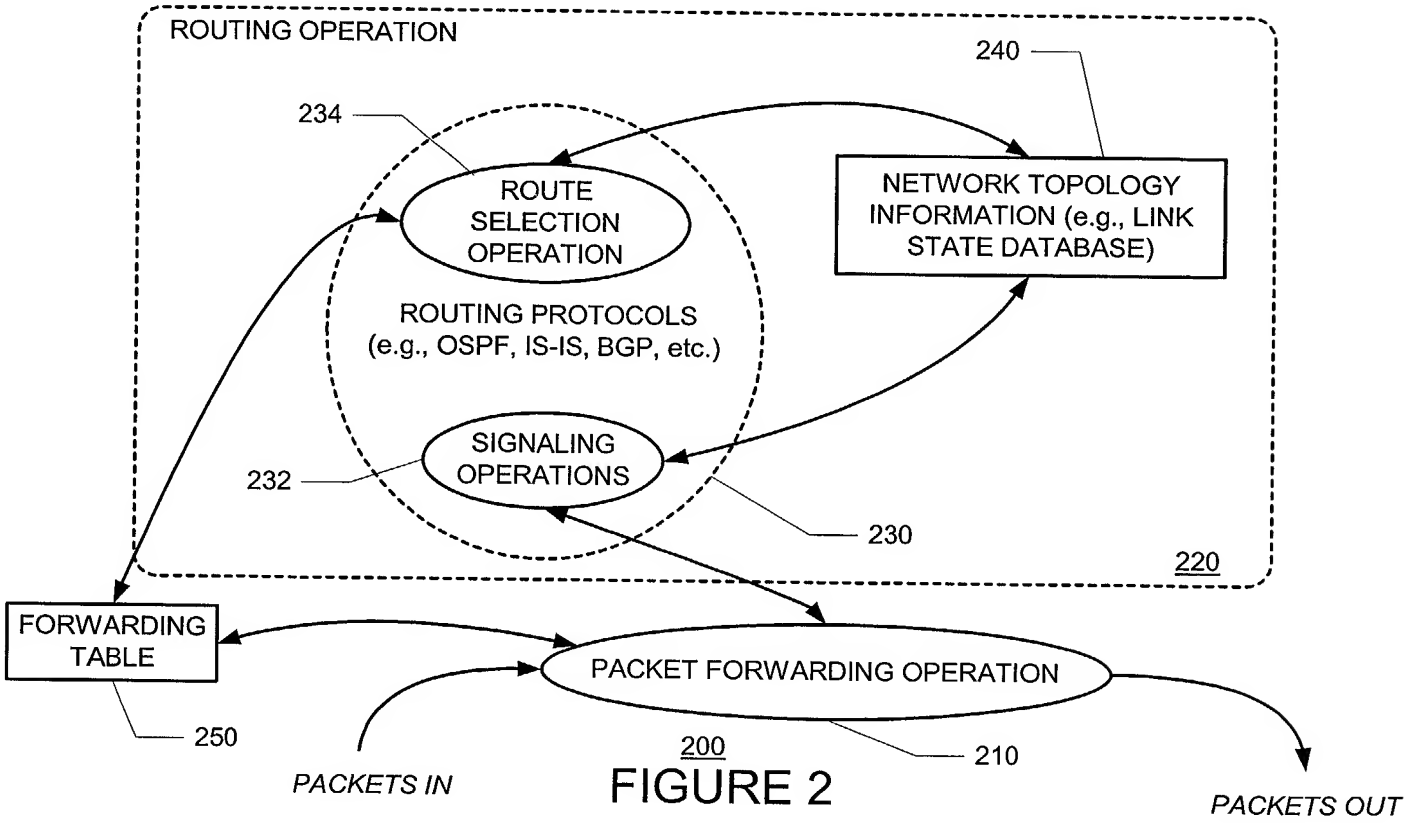

FIGURE 2

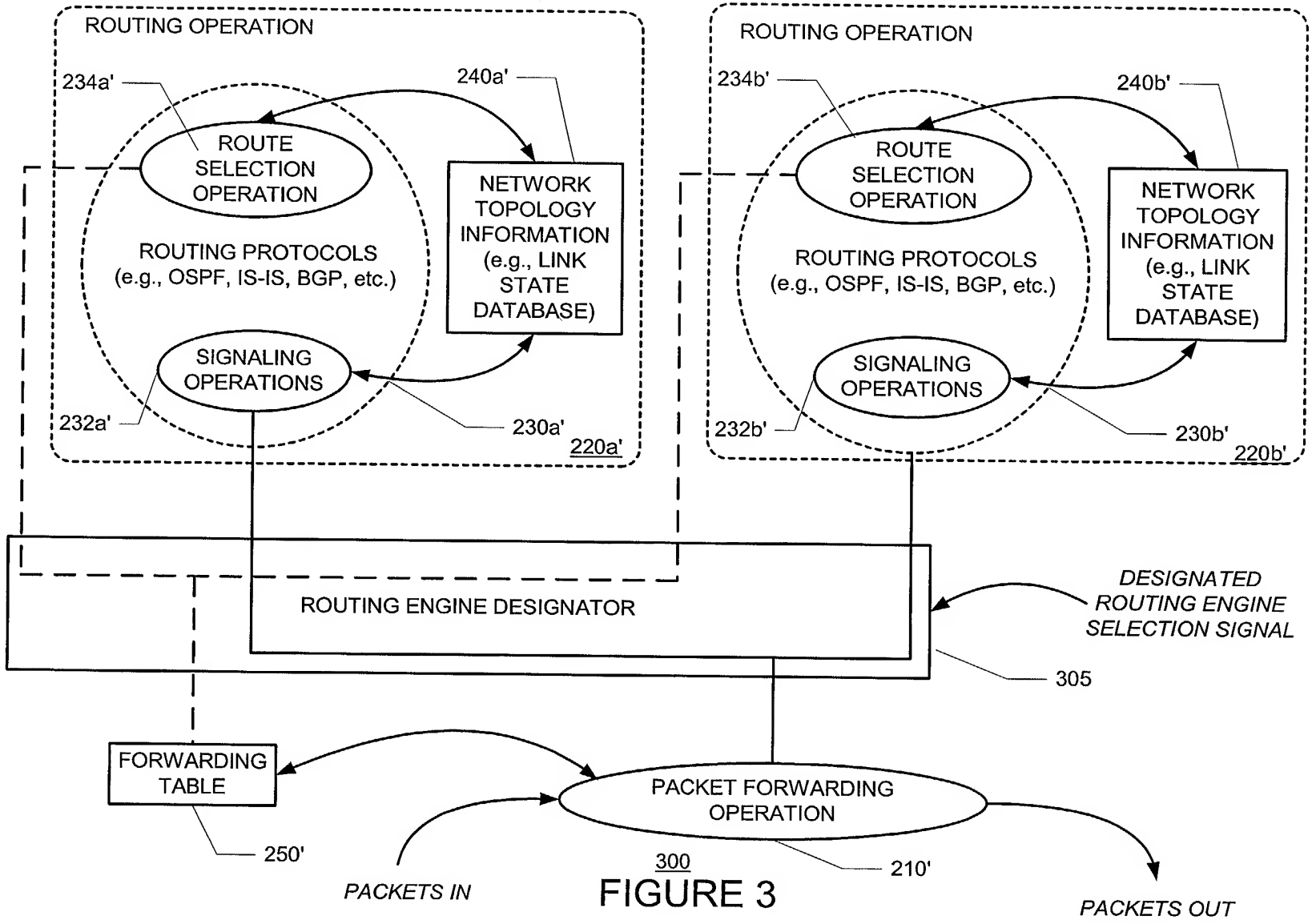
ROUTING OPERATION
234a'
240a'
ROUTE SELECTION OPERATION
NETWORK TOPOLOGY INFORMATION (e.g., LINK STATE DATABASE)
ROUTING PROTOCOLS (e.g., OSPF, IS-IS, BGP, etc.)
SIGNALING OPERATIONS
232a'
230a'
220a'
ROUTING OPERATION
234b'
240b'
ROUTE SELECTION OPERATION
NETWORK TOPOLOGY INFORMATION (e.g., LINK STATE DATABASE)
ROUTING PROTOCOLS (e.g., OSPF, IS-IS, BGP, etc.)
SIGNALING OPERATIONS
232b'
230b'
220b'
ROUTING ENGINE DESIGNATOR
DESIGNATED ROUTING ENGINE SELECTION SIGNAL
305
FORWARDING TABLE
250'
PACKET FORWARDING OPERATION
210'
300
PACKETS IN
PACKETS OUT

FIGURE 3

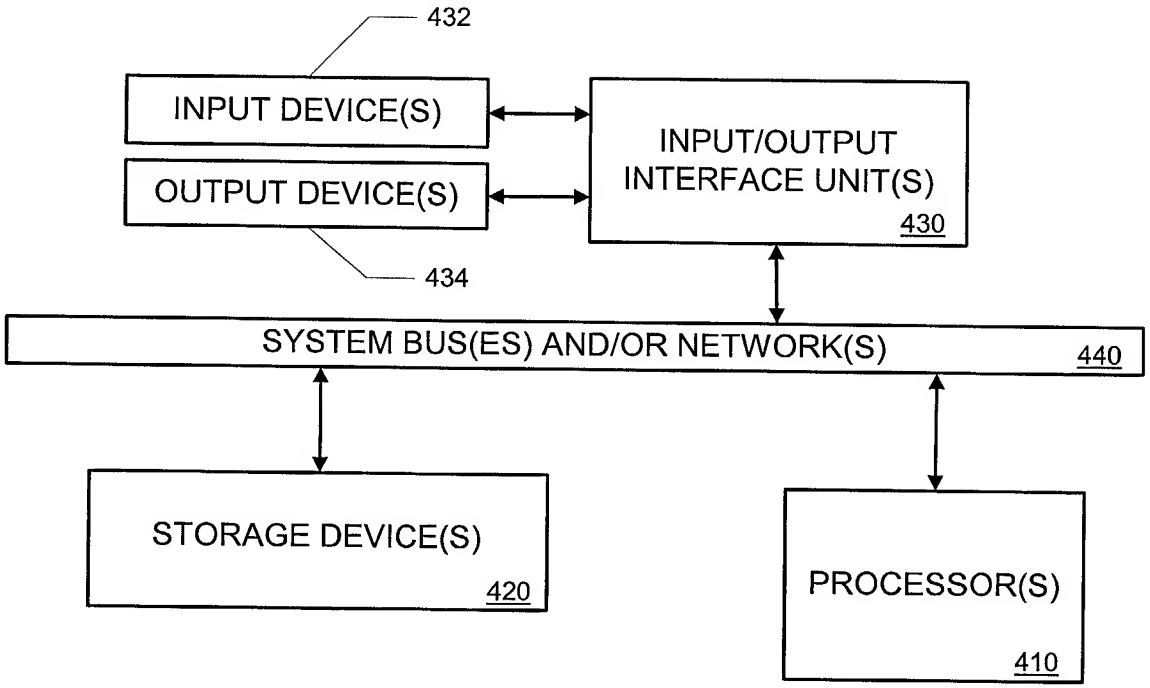
432
INPUT DEVICE(S)
OUTPUT DEVICE(S)
434
INPUT/OUTPUT
INTERFACE UNIT(S)
430
SYSTEM BUS(ES) AND/OR NETWORK(S)
440
STORAGE DEVICE(S)
420
PROCESSOR(S)
410
400

FIGURE 4

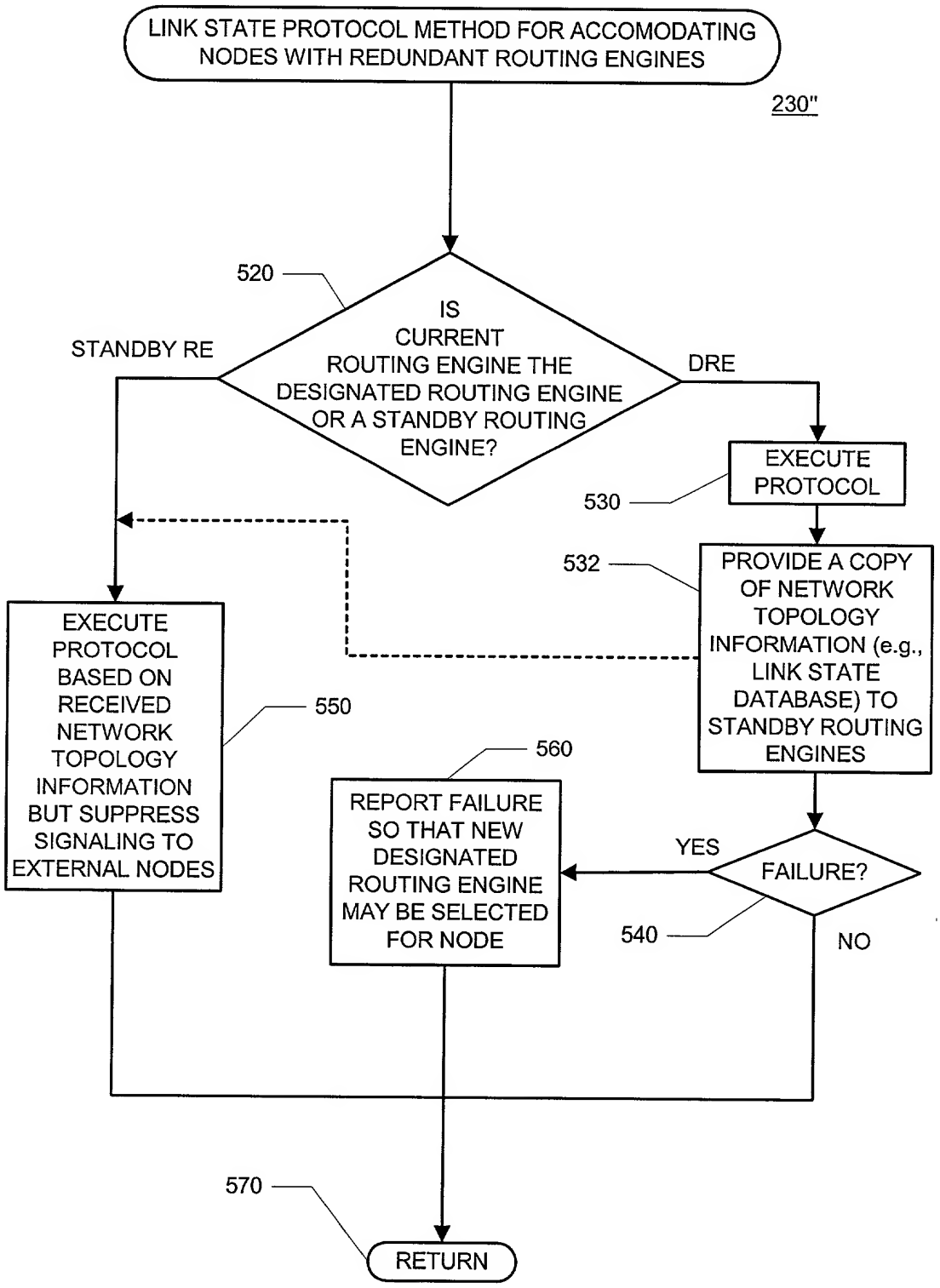
LINK STATE PROTOCOL METHOD FOR ACCOMODATING NODES WITH REDUNDANT ROUTING ENGINES
230"
520
IS CURRENT ROUTING ENGINE THE DESIGNATED ROUTING ENGINE OR A STANDBY ROUTING ENGINE?
STANDBY RE
DRE
EXECUTE PROTOCOL
530
532
PROVIDE A COPY OF NETWORK TOPOLOGY INFORMATION (e.g., LINK STATE DATABASE) TO STANDBY ROUTING ENGINES
EXECUTE PROTOCOL BASED ON RECEIVED NETWORK TOPOLOGY INFORMATION BUT SUPPRESS SIGNALING TO EXTERNAL NODES
550
560
REPORT FAILURE SO THAT NEW DESIGNATED ROUTING ENGINE MAY BE SELECTED FOR NODE
YES
FAILURE?
540
NO
570
RETURN

FIGURE 5

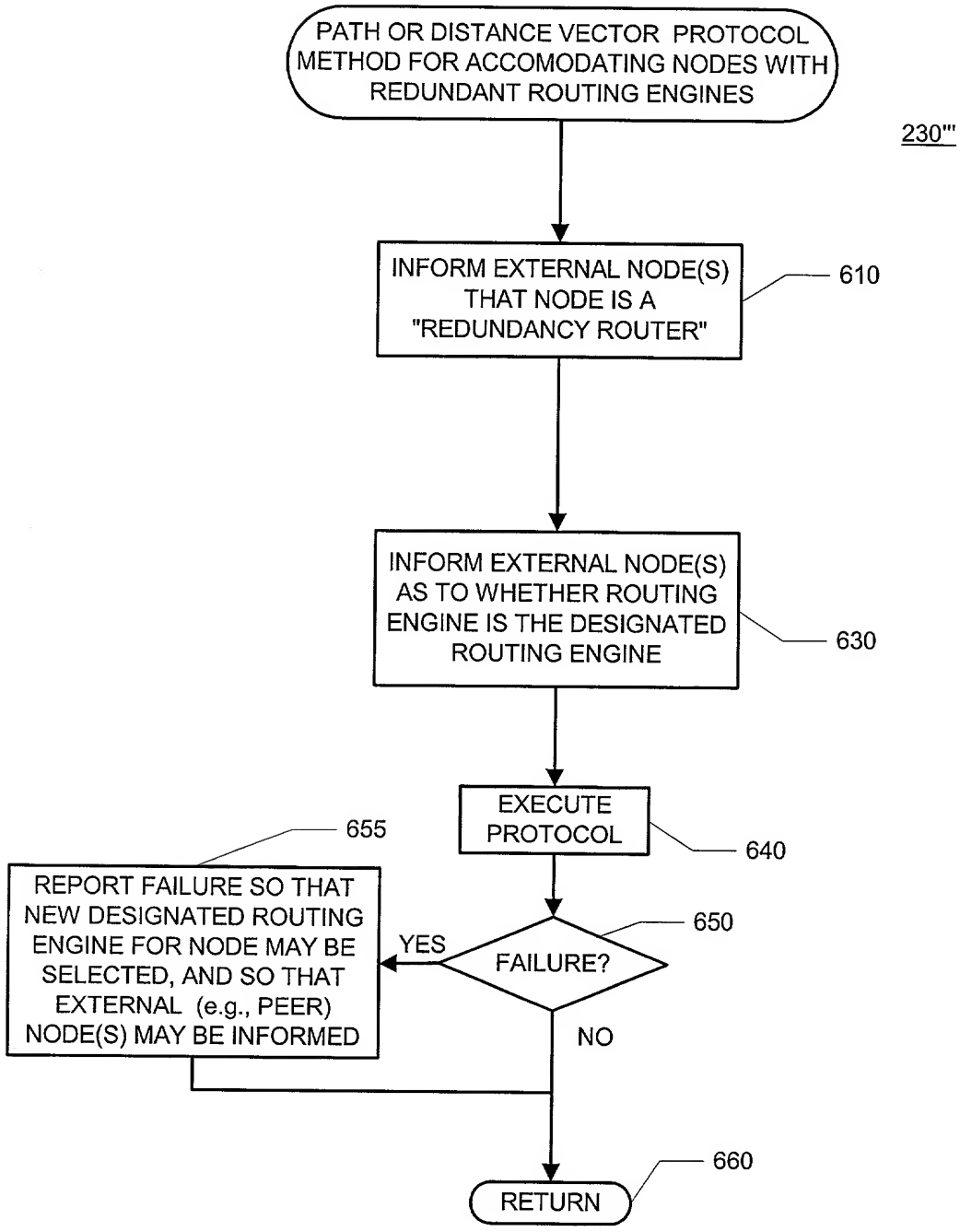
PATH OR DISTANCE VECTOR PROTOCOL METHOD FOR ACCOMODATING NODES WITH REDUNDANT ROUTING ENGINES
230'''
INFORM EXTERNAL NODE(S) THAT NODE IS A "REDUNDANCY ROUTER"
610
INFORM EXTERNAL NODE(S) AS TO WHETHER ROUTING ENGINE IS THE DESIGNATED ROUTING ENGINE
630
EXECUTE PROTOCOL
640
650
FAILURE?
YES
655
REPORT FAILURE SO THAT NEW DESIGNATED ROUTING ENGINE FOR NODE MAY BE SELECTED, AND SO THAT EXTERNAL (e.g., PEER) NODE(S) MAY BE INFORMED
NO
660
RETURN

FIGURE 6

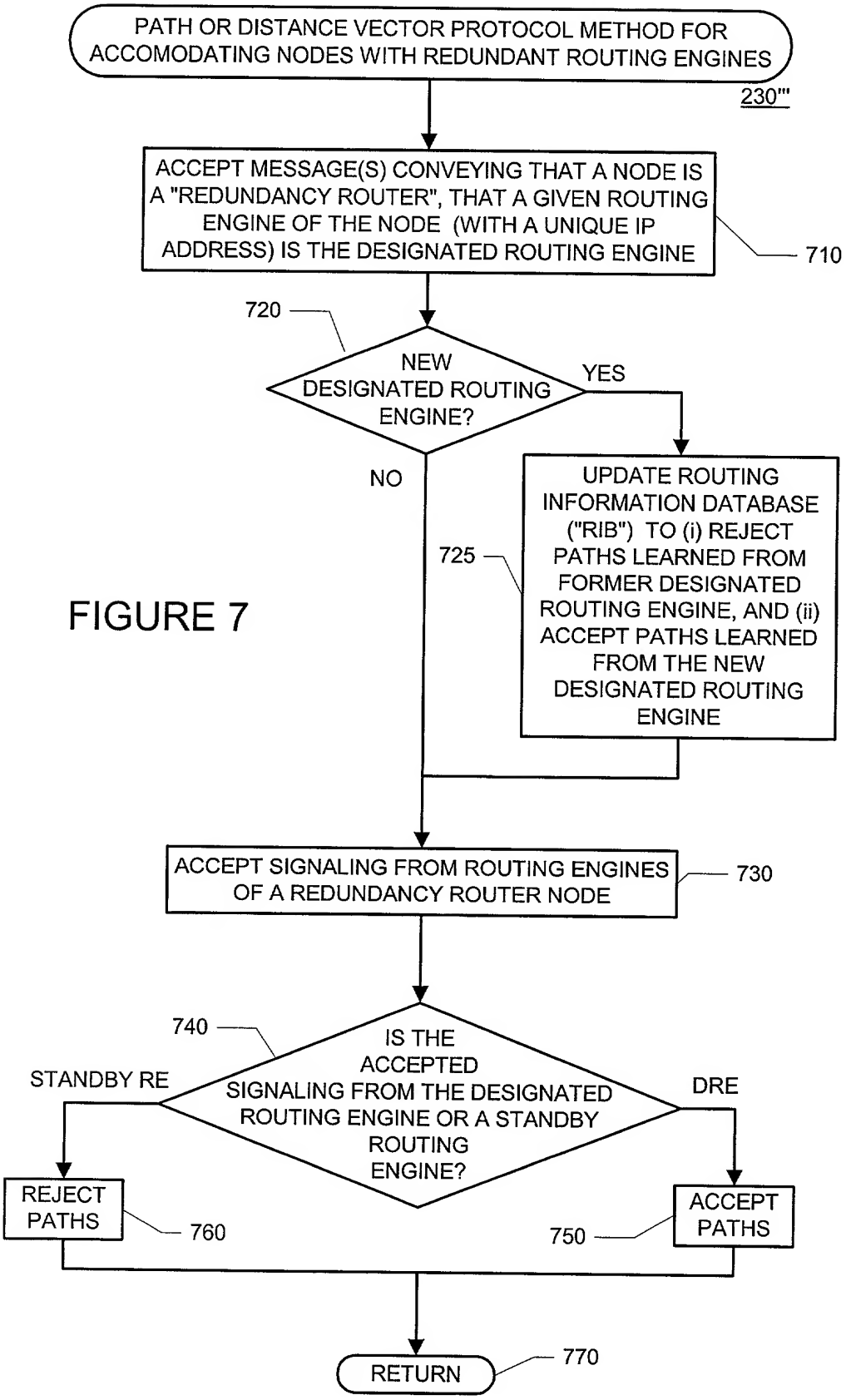
PATH OR DISTANCE VECTOR PROTOCOL METHOD FOR ACCOMODATING NODES WITH REDUNDANT ROUTING ENGINES
230'''
ACCEPT MESSAGE(S) CONVEYING THAT A NODE IS A "REDUNDANCY ROUTER", THAT A GIVEN ROUTING ENGINE OF THE NODE (WITH A UNIQUE IP ADDRESS) IS THE DESIGNATED ROUTING ENGINE
710
720
NEW DESIGNATED ROUTING ENGINE?
YES
NO
UPDATE ROUTING INFORMATION DATABASE ("RIB") TO (i) REJECT PATHS LEARNED FROM FORMER DESIGNATED ROUTING ENGINE, AND (ii) ACCEPT PATHS LEARNED FROM THE NEW DESIGNATED ROUTING ENGINE
725
ACCEPT SIGNALING FROM ROUTING ENGINES OF A REDUNDANCY ROUTER NODE
730
740
IS THE ACCEPTED SIGNALING FROM THE DESIGNATED ROUTING ENGINE OR A STANDBY ROUTING ENGINE?
STANDBY RE
DRE
REJECT PATHS
760
ACCEPT PATHS
750
RETURN
770

FIGURE 7

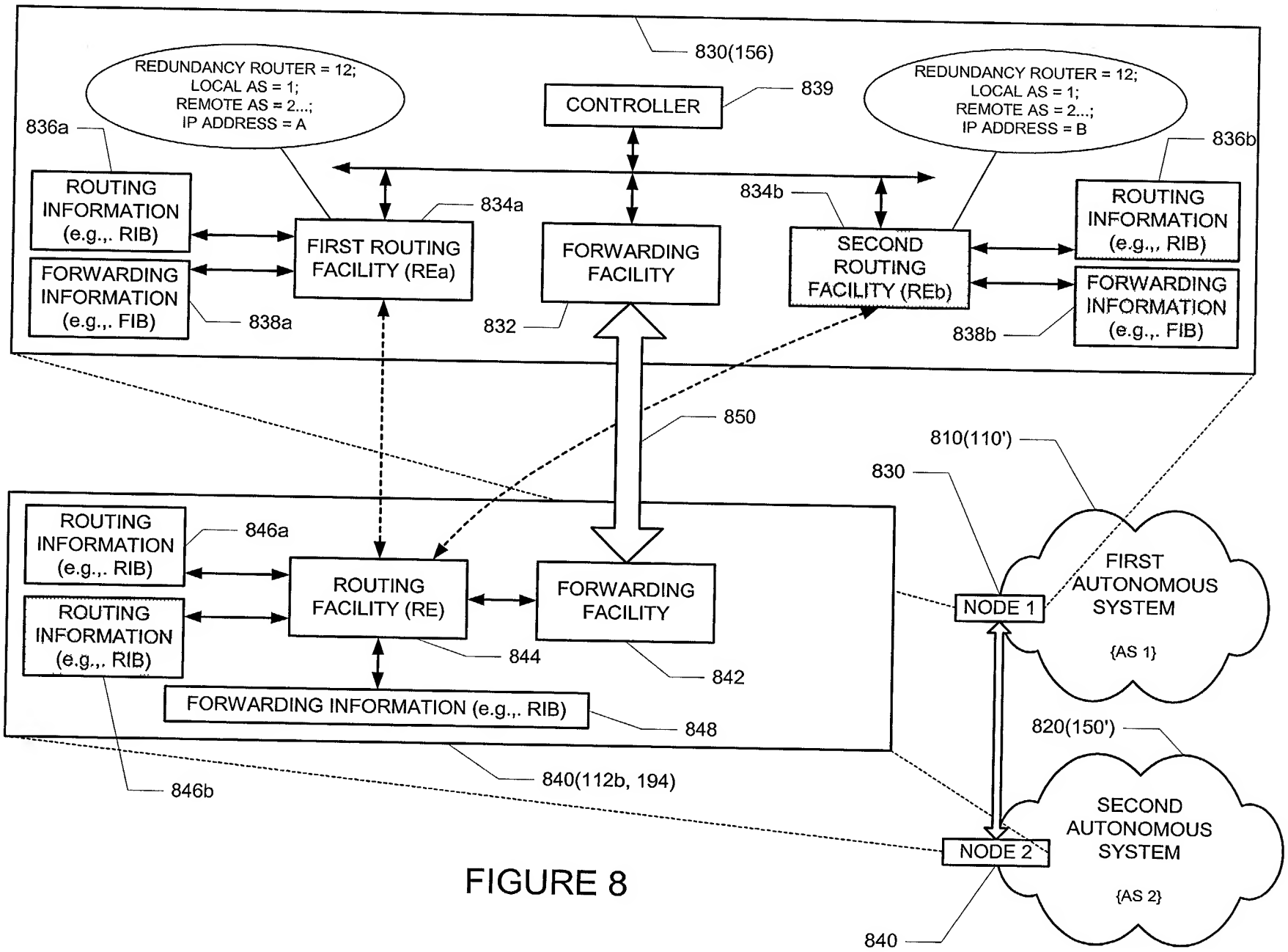
830(156)
REDUNDANCY ROUTER = 12;
LOCAL AS = 1;
REMOTE AS = 2...;
IP ADDRESS = A
CONTROLLER
839
REDUNDANCY ROUTER = 12;
LOCAL AS = 1;
REMOTE AS = 2...;
IP ADDRESS = B
836a
836b
ROUTING INFORMATION (e.g.,. RIB)
FORWARDING INFORMATION (e.g.,. FIB)
838a
FIRST ROUTING FACILITY (REa)
834a
FORWARDING FACILITY
832
834b
SECOND ROUTING FACILITY (REb)
ROUTING INFORMATION (e.g.,. RIB)
FORWARDING INFORMATION (e.g.,. FIB)
838b
850
810(110')
830
ROUTING INFORMATION (e.g.,. RIB)
846a
ROUTING INFORMATION (e.g.,. RIB)
ROUTING FACILITY (RE)
844
FORWARDING FACILITY
842
FORWARDING INFORMATION (e.g.,. RIB)
848
846b
840(112b, 194)
NODE 1
FIRST AUTONOMOUS SYSTEM
{AS 1}
820(150')
NODE 2
SECOND AUTONOMOUS SYSTEM
{AS 2}
840

FIGURE 8

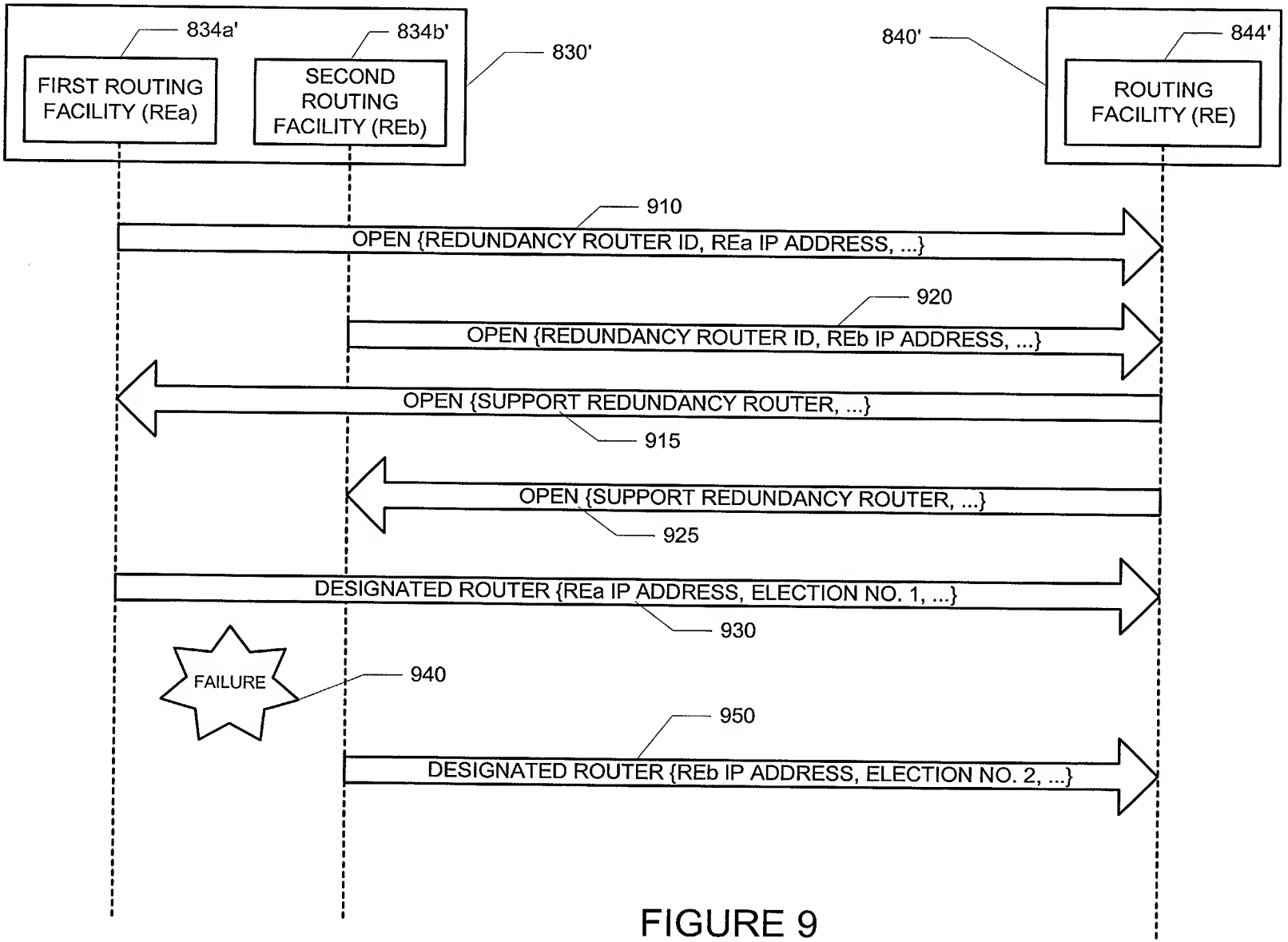
834a'
834b'
830'
840'
844'
FIRST ROUTING FACILITY (REa)
SECOND ROUTING FACILITY (REb)
ROUTING FACILITY (RE)
910
OPEN {REDUNDANCY ROUTER ID, REa IP ADDRESS, ...}
920
OPEN {REDUNDANCY ROUTER ID, REb IP ADDRESS, ...}
OPEN {SUPPORT REDUNDANCY ROUTER, ...}
915
OPEN {SUPPORT REDUNDANCY ROUTER, ...}
925
DESIGNATED ROUTER {REa IP ADDRESS, ELECTION NO. 1, ...}
930
FAILURE
940
950
DESIGNATED ROUTER {REb IP ADDRESS, ELECTION NO. 2, ...}

FIGURE 9

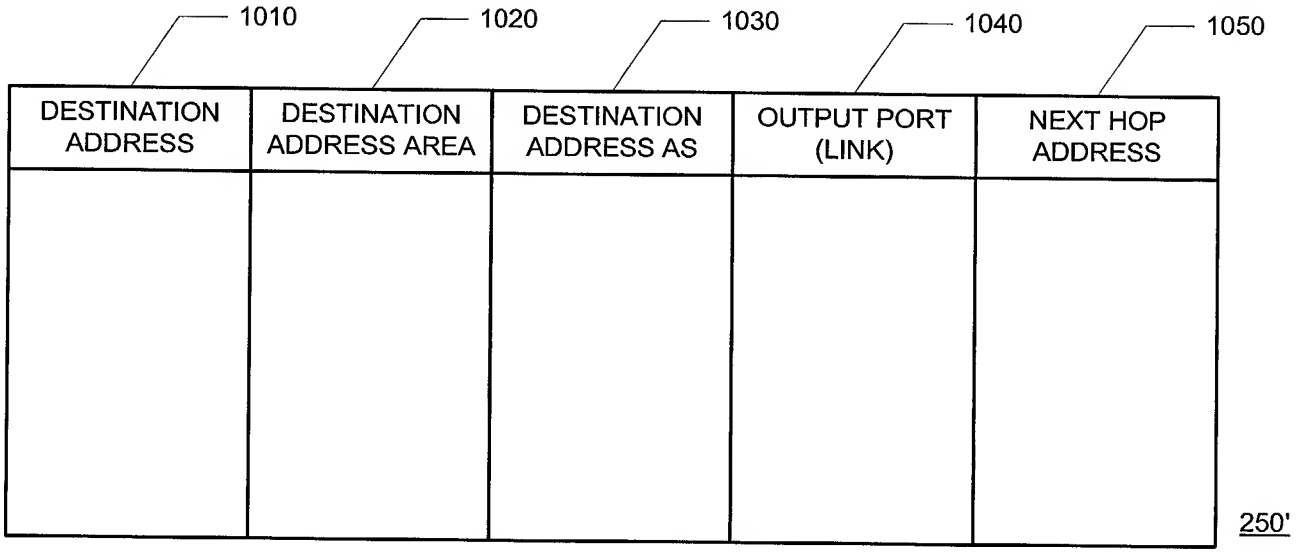
1010
1020
1030
1040
1050
DESTINATION ADDRESS
DESTINATION ADDRESS AREA
DESTINATION ADDRESS AS
OUTPUT PORT (LINK)
NEXT HOP ADDRESS
250'

FIGURE 10